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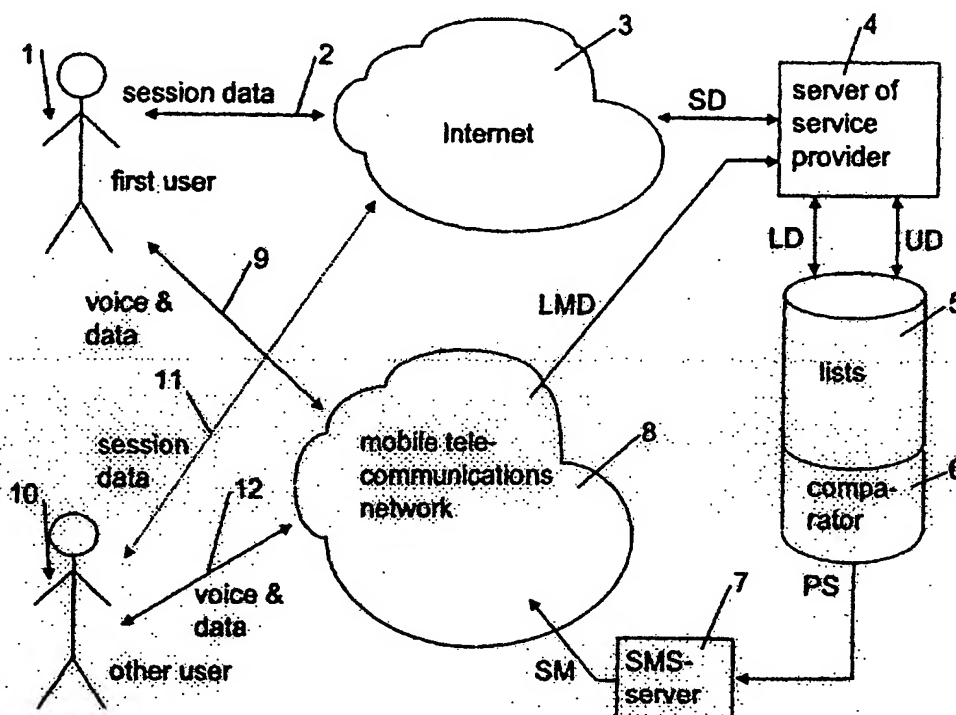
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**1015078** **2 May 2000 (02.05.2000)** **NL**
- (71) Applicant (for all designated States except US): **KONINKLIJKE KPN N.V. [NL/NL]**; Stationsplein 7, NL-9726 AE Groningen (NL).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **BAIS, Michel, Alexander [NL/NL]**; César Franckstraat 140, NL-2625 CC Delft (NL). **VAN SMIRREN, Dirk [NL/NL]**; Roerdompstraat 82, NL-2406 EK Alphen Aan Den Rijn (NL).
- (74) Agent: **WUYTS, Koenraad, Maria**; Koninklijke KPN N.V., P.O. Box 95321, NL-2509 CH The Hague (NL).
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[Continued on next page]

(54) Title: **MOBILE TELECOMMUNICATIONS SYSTEM WITH ALERTING SERVICE**



(57) Abstract: Mobile telecommunications system with an alerting service that enables users of a positioning service to automatically receive a text message on their mobile telephone when they are in each other's proximity. The above-mentioned users supply the provider of the alerting service with a list of persons whose proximity must be signalled.

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Title:** Mobile telecommunications system with alerting service

**A. Background of the invention**

The invention relates to a telecommunications system for mobile cellular  
5 communication and a method for application in the system, which telecommunications  
system comprises:

- positioning means providing for the determination of the location of an individual  
mobile terminal belonging to the telecommunications system,
- memory means providing for, at the request of a first user of a mobile terminal, the  
10 storage, or restorage with modified content, of a list of other users of mobile  
terminals selected by the first user of a mobile terminal, whereby said memory  
means also provide for the storage of location data originating from the positioning  
means, for which purpose the memory means are linked to the positioning means,  
which location data refers to mobile terminals of first users and other users from  
15 the stored lists,
- comparison means providing for the comparison of location data of the mobile  
terminal of the first user and mobile terminals of the other users selected by him,  
whereby said comparison means provide for the generation of a proximity signal  
that is a measure of the distance between the mobile terminal of the first user and  
20 the mobile terminal of another user from the list of other users.

A similar telecommunications system is known under the name CellPoint.  
This well-known system enables a subscriber of a GSM network to create a list of the  
names and telephone numbers of friends, acquaintances or family members for a service  
25 provider on that particular GSM network. When the subscriber subsequently wishes to  
locate a person from the list, he sends a request to the service provider to determine the  
location of that person (or rather the location of that person's mobile telephone). The  
system then sends the location of the person being traced to the subscriber in the form of  
a text message (SMS). This SMS message also indicates the distance between the  
30 subscriber and the other user based on the comparison of location data.

This prior art technology therefore enables the location of the person being  
traced to be determined in the system at a time specified by the subscriber of the

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positioning service. At that moment, the subscriber and the person being traced may be too far away from each other to allow personal contact within a short time and therefore often not at the desired time. Another person from the list may, however, be in the vicinity but is not being traced because the subscriber has not sent a search request for  
5 that person.

### **B. Summary of the invention**

The aim of a telecommunications system in accordance with the invention is to obviate the aforementioned drawbacks by creating a system that enables users of a  
10 positioning service to automatically receive a text message on their (GSM) telephone when those other users are in each other's. They do not need to send a command to this end. The positioning service thus becomes an alerting service.

A telecommunications system in accordance with the invention is  
15 characterised in that the positioning means provide for the determination of the current location of mobile terminals of first users and of mobile terminals of other users from the lists of other users at a time determined in the telecommunications system, and in that the comparison means provide for the generation of a proximity signal if and when the current distance between the mobile terminal of the first user and at least the mobile  
20 terminal of one other user from his list of other users falls below a pre-determined value. This ensures that an action results when users of the service are in each other's proximity and not at a moment at which personal contact is improbable.

In accordance with a first preferred embodiment of the invention, the  
25 telecommunications system is characterised in that it provides for the sending of a text message to the first user in response to the generation of a proximity signal for the first user and at least one other user from his list of other users. If the list of 'other users' contains more than one person, the message from the alerting service must indicate which of the 'other users' is in the vicinity. This can be achieved in a GSM system by  
30 sending a text message generated by the telecommunications system.

In accordance with a second preferred embodiment of the invention, the telecommunications system is characterised in that the text message sent to the first user

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contains the telephone number of the mobile terminal of the at least one other user. If the text message sent to the subscriber of the alerting service contains the telephone number of the person from his list who is in the vicinity, the subscriber can immediately contact that person without first having to look up the number.

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In accordance with a third preferred embodiment of the invention, the telecommunications system is characterised in that it provides for the sending of a text message to the at least one other user in response to the generation of a proximity signal for the first user and at least one other user from his list of other users. When the other  
10 user in the vicinity of the first user is notified of this proximity in a text message, he can also take the initiative to contact the first user. The other user could also be a company that could, for example, send an advert or notice of a special offer to the first user when he is in the vicinity.

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In accordance with a fourth preferred embodiment of the invention, the telecommunications system is characterised in that the text message sent to the at least one other user contains the telephone number of the mobile terminal of the first user. Again, the advantage of this method is that the number does not have to be looked up before contact is made.

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In accordance with a fifth preferred embodiment of the invention, the telecommunications system is characterised in that the memory means are linked to a multimedia network, for example the Internet, which link allows the first user of a mobile terminal to store, or re-store with modified content, in the memory means a list  
25 of other users of mobile terminals selected by the first user of a mobile terminal. This embodiment enables the user to create and manage lists of 'other users' in a simple and user-friendly manner.

A method in accordance with the invention is characterised in that it  
30 comprises:

the determination of the current location of mobile terminals of first users and the mobile terminals of other users from the lists of other users at times specified in the telecommunications system,

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- the generation of proximity signals if and when the current distance between the mobile terminal of the first user and of at least one other user from his list of other users falls below a pre-determined value.

5

### **C. Reference**

<http://www.cellpt.com>      CellPoint website

### **D. Brief description of the drawing**

The invention will now be explained in more detail by means of a description of an embodiment with reference to a drawing in which:

Fig. 1 is a schematic representation of a telecommunications system in accordance with the invention which also includes the link to a multimedia network (the Internet);

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Fig. 2 shows the various possible states of the system when sending text messages;

Fig. 3 is a schematic representation of the program steps for controlling the telecommunications system in accordance with the invention.

20

### **E. Description of an embodiment example**

The telecommunications system for mobile cellular communication in accordance with the invention may, for example, form part of a GSM network, which network then provides an alerting service.

25

In Fig. 1, (1) is a first user of the alerting service. The first user (1) can gain access to a multimedia network, the Internet (3) in this example, via a connection (2). Millions of computers are connected to the Internet worldwide, including a server (4) of a service provider for the alerting service. This server receives data from the service users in the form of session data (SD). This data is necessary for the initial registration for the service, the entry of lists of other users into the memory means, database (5), and for editing such lists at a later stage if necessary. The lists in the database (5) contain

30

identification data (UD) relating to the users of the service such as names and telephone numbers and the current location data (LD) of the users. In the outlined embodiment of the invention, the location data is derived by the server (4) of the service provider from the location measurement data (LMD) originating from the mobile telecommunications network (8) to which the first user (1) and the other users, of which (10) is one user, are connected. Mobile telephones are fitted with modified SIMs (Subscriber Identification Modules) in this embodiment. As a result of this (software) modification, such telephone sets are able to send data relating to the nearest base station (based on reception strengths) via the mobile telecommunications network (8) to the server (4) of the service provider at regular intervals. User locations are therefore determined by the server (4) based on location measurement data (LMD). Only indirect use is made of location data present in the actual mobile telecommunications network in this embodiment. The positioning means are distributed across the network (8) and the server (4) in this way. One of the reasons for choosing this solution is because the use of all of the location data present in a mobile network is not automatically permitted. If, with their permission, the manager of a mobile network allowed a group of subscribers of that network to directly use the location data in the network, the service provider would not have to determine the current locations of users itself and the mobile telephones would not have to be modified. As an alternative to the embodiment described here, mobile telephones used for alerting service purposes could be fitted with independent positioning means (such as GPS receivers) that could send their data to the server of an alerting service provider via the mobile network. Modified mobile telephones would also have to be used for this alternative embodiment.

25           In the described embodiment, another user (10) of the alerting service gives his permission to be included in the list of the first user via an Internet (3) connection (11) so that the location of his mobile telephone can be recorded in the database (5). It should be noted that the subscriber of the mobile telecommunications network, referred to here as the 'other user', may also be a 'first user' with his own list of 'other users'.  
30   Where the term 'list members' is used in the remaining text, this refers to a first user together with the other users from his list of other users. A user of the alerting service can be a fellow list member of other users of the alerting service via various lists.

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Comparison means are linked to the database (5) in the form of a comparator (6). This allows the locations of the first and other users to be regularly compared with each other for each list of first and other users. When the distance between two (or more) list members falls below a pre-determined value, a proximity signal (PS) is generated.

5 This can be achieved in practice as follows. In a mobile telecommunications system, a number of geographically linked base stations are grouped together in a coverage area which has a code, known as the 'Location Area Code' (LAC), assigned to it. Each base station in the geographically determined group therefore has the same LAC. The area covered by the telecommunications network (8) is divided into a number of LAC areas

10 with an equal number of LACs. Each base station in a specific LAC area has a unique number, the 'Cell ID'. The combination of an LAC and a Cell ID provides the location of one specific base station. If two users of a mobile telecommunications network have the same LAC they are located in the same LAC area. Only when both users' Cell ID is also identical can it be established that they are in each other's proximity for the purpose

15 of the alerting service. It is also conceivable that the absolute positions of base stations can be deduced from the location measurement data (LMD) and converted into positions on a geographical map. The distance between two base stations involved can then be determined with the aid of an appropriate algorithm. This requires extra software and calculation time. The advantage of this is that cell size has less influence on the

20 reliability of the proximity signal. The size (range) of a cell in the Netherlands can vary from 500 m to 5 km.

When a proximity signal is generated, the SMS server (7) is prompted to send a text message (SMS) to the two (or more) list members involved via standard voice and data channels (9) and (12). Such a text message may read: "XYZ is nearby,

25 telephone number 1234567". Those involved can then telephone each other to arrange to meet up, for example. If the other user is a company, for example an outlet of a retail chain, the message could read: "<company name> is nearby, outlet <address>". In this case, receipt of the message by the other user could prompt an advert message in the form of a second text message from the location of the other user to the first user.

30 Alternatively, the company involved, as a user of the alerting service, could prompt the SMS server (7) to send an advert within the first text message.

As described above, the database (5) contains lists of first users and their



other users (to be indicated by the first users). Each list contains the necessary identification data (for example names and telephone numbers) of the related subscribers of the mobile telecommunications network (8). The relationships between subscribers, users of the alerting service, are included in the database as part of the user information.

5

Simply sending a text message each time two users from the same list are in each other's proximity may lead to the following problem. If one of the two users briefly uses a different base station, whether or not this is due to a brief relocation, a proximity signal will be generated again when he returns to the original base station, which means  
10 that both users will receive a text message again. This is not desirable since they already know that they are near each other. In order to prevent this, an SMS message status is also recorded in the database (5) as indicated in Fig. 2.

In Fig. 2 the original status 'No SMS message sent' (20), indicated by an O  
15 in the database (5) in the described embodiment, corresponds to the situation in which proximity has not yet been established. If a proximity signal is generated when two users from a list enter each other's proximity, an SMS message is sent to both users and the status changes to 'SMS message sent I' (21), indicated by an S in the database (5) in the described embodiment. This status remains valid until one of the list members clearly  
20 moves to another location such that the LAC changes from the one which caused the proximity signal to be generated. The status then changes to 'SMS message sent II', (22) indicated by a Z in the database (5) in the described embodiment. If one of the two list members then moves such that their LACs are again identical within a pre-determined time span T1, a situation evidently occurs in which both list members travel together for  
25 some time and enter areas covered by a succession of different base stations. The status 'SMS message sent I' (21) then becomes valid again. If the status 'SMS message sent II' (22) is valid and the LACs of both list members remain different after a pre-determined time span T1, it is then assumed that the system must wait until they enter each other's proximity again and the original status 'No SMS message sent' (20) becomes valid  
30 again.

The database (5) thus contains three files: one in which the user data and the mutual relationships are recorded, one in which the location data and corresponding user

identifications are stored and one in which the 'SMS status' can be found.

Fig. 3 demonstrates how the software in the server (4) co-ordinates the three files. If a user's mobile telephone automatically connects to the server to send the  
5 location measurement data, the identification (the telephone number) of the user is sought so that the data can be stored in the appropriate place within the database. Once the telephone number is found, the derived location data is stored. The relationships of the user involved are then examined. The corresponding location data for each existing relationship is taken into consideration. If there is corresponding location data within  
10 certain boundaries (in the described embodiment: LAC and Cell ID are equal), the 'SMS status' (O, S, or Z) is then examined. If corresponding location data exists, but an SMS has not yet been sent, the telephone number of a related nearby user is called up from the location data file. An SMS message containing the telephone number found is then sent to both of the users in question.

**F. Claims**

1. Telecommunications system for mobile cellular communications comprising:

- positioning means providing for the determination of the location of an individual  
5 mobile terminal belonging to the telecommunications system,
  - memory means providing for, at the request of a first user of a mobile terminal, the storage, or restorage with modified content, of a list of other users of mobile terminals selected by the first user of a mobile terminal, whereby said memory means also provide for the storage of location data originating from the positioning  
10 means, for which purpose the memory means are linked to the positioning means, which location data refers to mobile terminals of first users and other users from the stored lists,
  - comparison means providing for the comparison of location data of the mobile terminals of the first user and mobile terminals of the other users selected by him,  
15 whereby said comparison means provide for the generation of the proximity signal that is a measure of the distance between the mobile terminal of the first user and the mobile terminal of another user from the list of other users,
- characterised in that the positioning means provide for the determination of the current location of mobile terminals of first users and of mobile terminals of other users from  
20 the lists of other users at times determined in the telecommunications system, and that comparison means provide for the generation of the proximity signal if and when the current distance between the mobile terminal of a first user and at least the mobile terminal of one other user from his list of other users falls below a pre-determined value.

25 2. Telecommunications system according to claim 1, characterised in that it provides for the sending of a text message to a first user in response to the generation of a proximity signal for the first user and at least one other user from his list of other users.

3. Telecommunications system according to claim 2, characterised in that the  
30 text message sent to the first user contains the telephone number of the mobile terminal of the at least one other user.

4. Telecommunications system according to claim 1, characterised in that it

provides for the sending of a text message to the at least one other user in response to the generation of a proximity signal for the first user and at least one other user from his list of other users.

5 5. Telecommunications system according to claim 4, characterised in that the text message sent to the at least one other user contains the telephone number of the mobile terminal of the first user.

6. Telecommunications system according to claim 1, characterised in that the  
10 memory means are linked to a multimedia network, for example the Internet, which link, during a multimedia session, allows the first user of a mobile terminal to store, or re-store with modified content, in the memory means a list of other users of mobile terminals selected by the first user of a mobile terminal.

15 7. Method for application in a telecommunications system for mobile cellular communication, which telecommunications system comprises:

- positioning means providing for the determination of the location of an individual mobile terminal belonging to the telecommunications system,
  - memory means providing, at the request of a first user of a mobile terminal, the  
20 storage, or restorage with modified content, of a list of other users of mobile terminals selected by the first user of a mobile terminal, whereby said memory means also provide for the storage of location data originating from the positioning means, for which purpose the memory means are linked to the positioning means, which location data refers to mobile terminals of first users and other users from  
25 the stored lists,
  - comparison means providing for the comparison of location data of the mobile terminal of the first user and mobile terminals of the other users selected by him, whereby said comparison means provide for the generation of a proximity signal that is a measure of the distance between the mobile terminal of the first user and  
30 the mobile terminal of another user from the list of other users,
- whereby said method comprises the following steps:
- the determination of the location of an individual mobile terminal belonging to the telecommunications system with the aid of the positioning means,

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- the storage, or the restorage with modified content, in the memory means, at the request of a first user of a mobile terminal, of a list of other users of mobile terminals selected by the first user of a mobile terminal,
- the storage in the memory means of location data originating from the positioning means referring to mobile terminals of first users and mobile terminals of other users from the stored lists,
- the comparison with the aid of the comparison means of location data of the mobile terminal of the first user and mobile terminals of the other users selected by the first user, whereby said comparison means generate a proximity signal that is a measure of the distance between the mobile terminal of the first user and of another user from the list of other users,

characterised in that said method furthermore comprises:

- the determination of the current location of mobile terminals of first users and those of other users from the lists of other users at times specified in the telecommunications system,
- the generation of the proximity signal if and when the current distance between the mobile terminal of the first user and of at least one other user from his list of other users falls below a pre-determined value.

8. Telecommunications system according to claim 7, characterised in that said method furthermore comprises the sending of a text message to the first user in response to the generation of a proximity signal for the first user and at least one other user from his list of other users.

9. Method according to claim 8, characterised in that the text message sent to the first user contains the telephone number of the mobile terminal of the at least one other user.

10. Method according to claim 7, characterised in that said method furthermore comprises the sending of a text message to the at least one other user in response to the generation of a proximity signal for a first user and at least one other user from his list of other users.

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11. Method according to claim 8, characterised in that the text message sent to the at least one other user contains the telephone number of the mobile terminal of the first user.

- 5 12. Method according to claim 7, characterised in that the memory means are linked to a multimedia network, for example the Internet, and the method furthermore enables the first user of a mobile terminal to store, or re-store with modified content, in the memory means during a multimedia network session a list of other users of mobile terminals selected by the first user of a mobile terminal.

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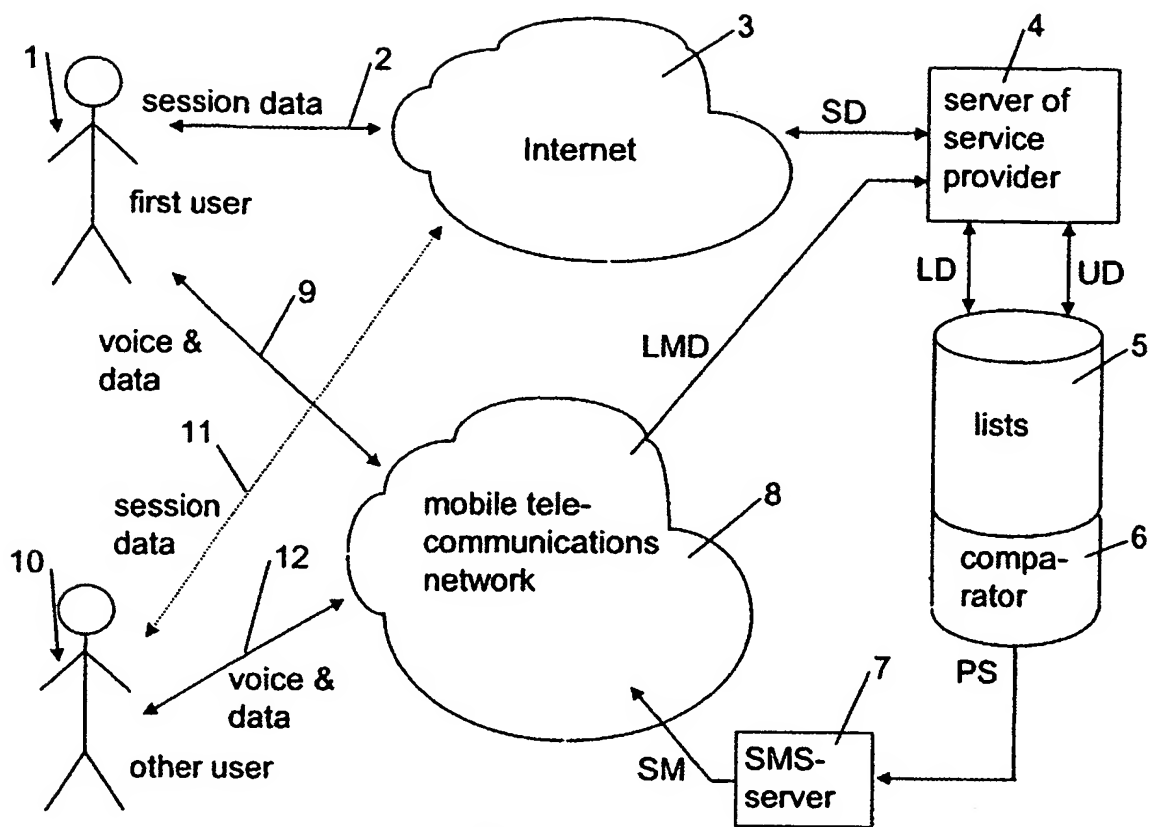


Fig. 1

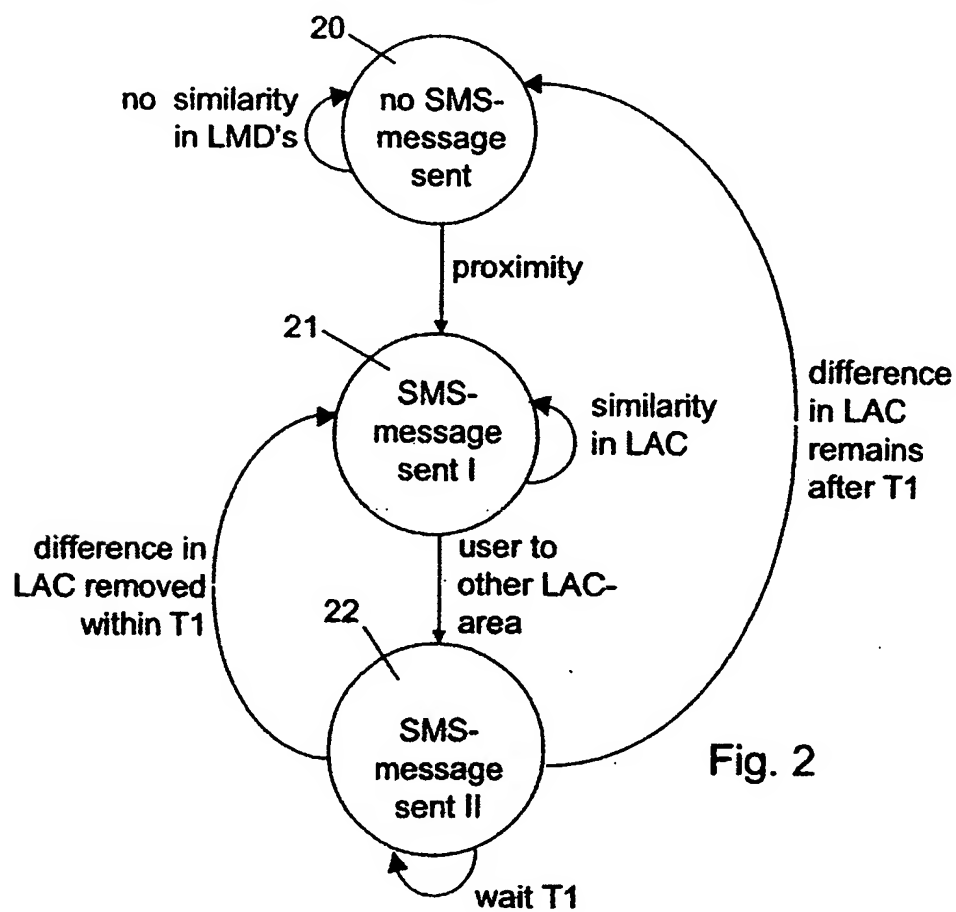


Fig. 2

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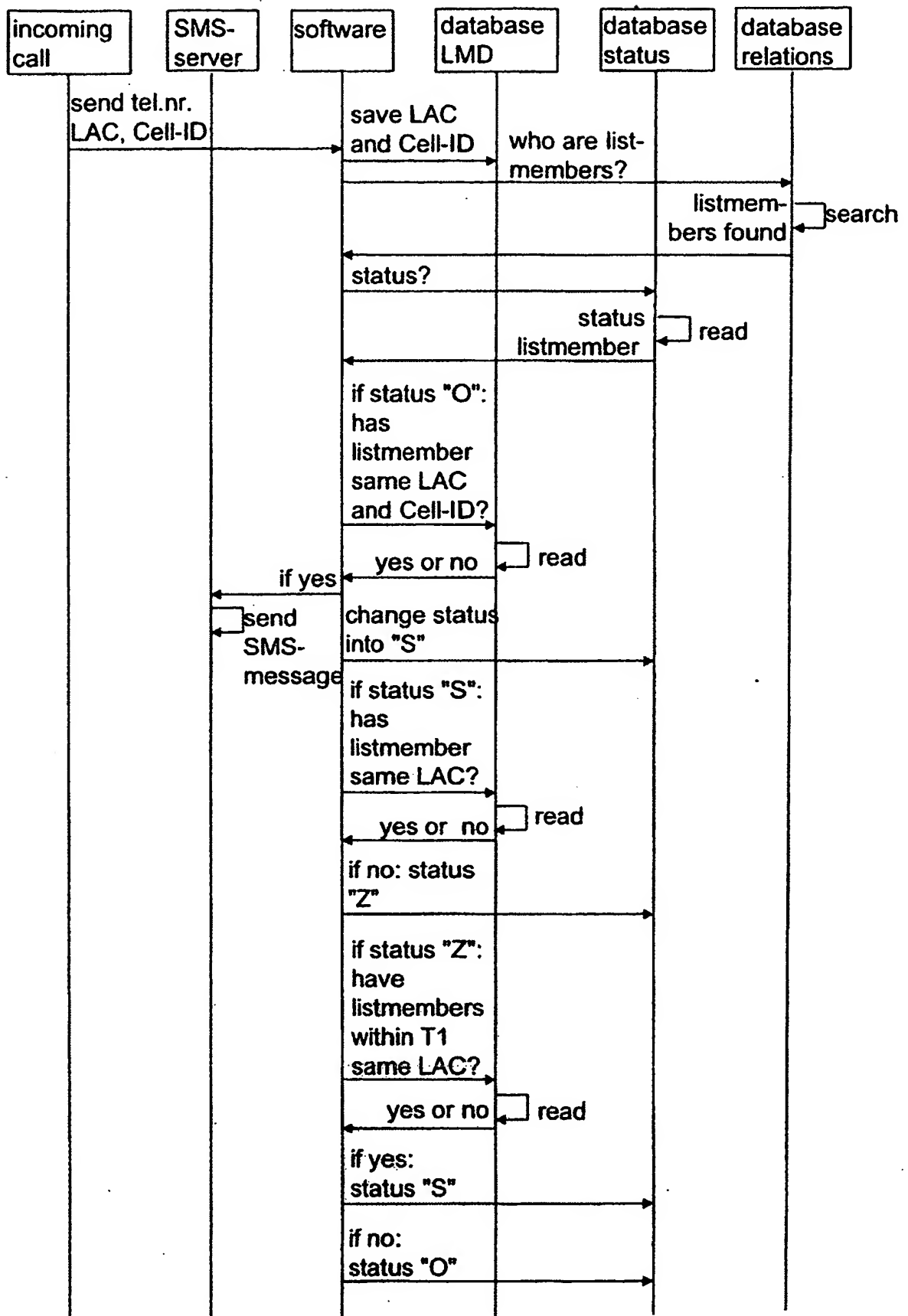


Fig. 3



## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/EP 01/05109

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 H04Q7/22

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00 22860 A (DEGNBOL JANUS FRIIS) 20 April 2000 (2000-04-20) page 3, line 1 - page 6, line 17 page 9, line 32 - page 10, line 23 page 17, line 5 - line 10 abstract; figures 1-4	1-12
X	WO 99 66757 A (ERICSSON INC) 23 December 1999 (1999-12-23)	1,7
A	the whole document	2,3,8,9
A	FR 2 615 957 A (DUPUCH CHARLES) 2 December 1988 (1988-12-02) the whole document	1,7

☐ Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax (+31-70) 340-3016

Authorized officer

Coppieters, S

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date		Patent family member(s)	Publication date
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